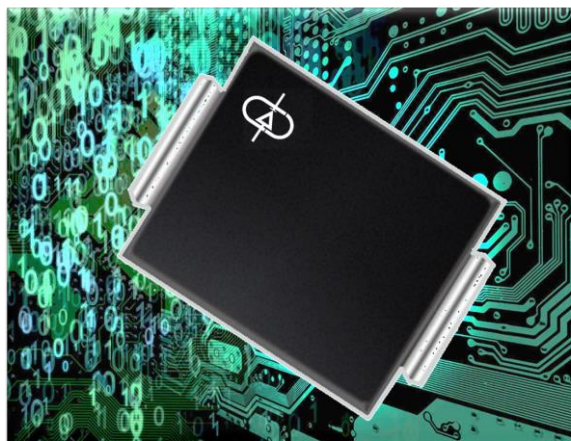


400 WATT SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

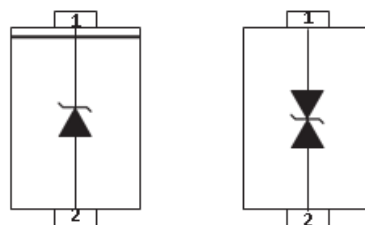
STAND-OFF VOLTAGE 5.0 TO 440V

DESCRIPTION:



The ALPSMAJXX/C (UNI/BI) and ALPSMAJXXA/CA (UNI/BI) Series are Surface Mount Transient Voltage Suppressors arrays series that Ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom.

The ALPSMAJXX/C (UNI/BI) and ALPSMAJXXA/CA (UNI/BI) Series has a peak pulse power rating of 400 Watts for a 10/1000 μ s waveshape.



FEATURES:

- Glass Passivated junction
- 400 Watts Peak Pulse Power per capability with a $t_p = 10/1000\mu$ s waveform, repetition rate (duty cycle): 0.01% (300W above 78V)
- Low profile package with built-in strain relief for surface mounted applications
- Low incremental surge resistance
- Excellent Clamping Capability
- Very Fast Response Time
- High temperature soldering guaranteed: 250°C/10 seconds at terminals
- Unidirectional & Bidirectional Configurations
- Available in Multiple Voltages
- RoHS Compliant & REACH Compliant

APPLICATIONS:

- Optimized for LAN protection applications
- Protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications

MECHANICAL CHARACTERISTICS

- Epoxy: Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- Case: Molded plastic, DO-214AC / SMA.
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode end except Bipolar
- Mounting Position: Any.



beyond boundaries...

ALPSMAJXX&C Series
ALPSMAJXXA&CA Series
DO-214AC (SMA)

TYPICAL DEVICE CHARACTERISTICS

MAXIMUM RATINGS $T_A @ 25^\circ\text{C}$ Unless Otherwise Specified			
PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power dissipation with a $t_p = 10/1000\mu\text{s}$ waveform ^(1, 2) , (see Fig. 1)	P_{PPM}	400	Watts
Peak Pulse Current with a $t_p = 10/1000\mu\text{s}$ waveform ⁽¹⁾	I_{PPM}	See Next Table	Amps
Peak Forward Surge Current, 8.3ms single half sinewave - Unidirectional Only ⁽²⁾	I_{FSM}	40	Amps
Typical thermal resistance, junction to ambient ⁽³⁾	$R_{\theta JA}$	120	$^\circ\text{C}/\text{W}$
Typical thermal resistance, junction to lead	$R_{\theta JL}$	30	$^\circ\text{C}/\text{W}$
Operating Temperature Range	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
NOTE 1. Non-repetitive current pulse per Fig.3 and derated above $T_A = 25^\circ\text{C}$ per Fig.2. Rating is 300W above 78V. 2. Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal 3. Mounted on minimum recommended pad layout			

ELECTRICAL CHARACTERISTICS PER LINE $T_A @ 25^\circ\text{C}$ Unless Otherwise Specified							
$V_F = 3.5\text{V}$ at $I_F = 25\text{A}$ (uni-directional only)							
PART NUMBER (Notes 5-6)	STAND-OFF VOLTAGE V_{WM} VOLTS	BREAKDOWN VOLTAGE $V_{(BR)}$ @ I_T VOLTS ⁽¹⁾		TEST CURRENT @ I_T mA	MAXIMUM CLAMPING VOLTAGE @ I_{PPM} V_C VOLTS	MAXIMUM PEAK PULSE SURGE CURRENT @ $I_{PPM}^{(2)}$ AMPS	MAXIMUM REVERSE LEAKAGE @ V_{WM} $I_D^{(3)}$ μA
		MIN	MAX				
ALPSMAJ5.0 / C	5.0	6.40	7.82	10	9.6	41.7	800
ALPSMAJ5.0A / CA ⁽⁵⁾	5.0	6.40	7.07	10	9.2	43.5	800
ALPSMAJ6.0 / C	6.0	6.67	8.15	10	11.4	35.1	800
ALPSMAJ6.0A / CA	6.0	6.67	7.37	10	10.3	38.8	800
ALPSMAJ6.5 / C	6.5	7.22	8.82	10	12.3	32.5	500
ALPSMAJ6.5A / CA	6.5	7.22	7.98	10	11.2	35.7	500
ALPSMAJ7.0 / C	7.0	7.78	9.51	10	13.3	30.1	200
ALPSMAJ7.0A / CA	7.0	7.78	8.60	10	12.0	33.3	200
ALPSMAJ7.5 / C	7.5	8.33	10.2	1.0	14.3	28.0	100
ALPSMAJ7.5A / CA	7.5	8.33	9.21	1.0	12.9	31.0	100
ALPSMAJ8.0 / C	8.0	8.89	10.9	1.0	15.0	26.7	50
ALPSMAJ8.0A / CA	8.0	8.89	9.83	1.0	13.6	29.4	50
ALPSMAJ8.5 / C	8.5	9.44	11.5	1.0	15.9	25.2	10
ALPSMAJ8.5A / CA	8.5	9.44	10.4	1.0	14.4	27.8	10
ALPSMAJ9.0 / C	9.0	10.0	12.2	1.0	16.9	23.7	5.0
ALPSMAJ9.0A / CA	9.0	10.0	11.1	1.0	15.4	26.0	5.0

ELECTRICAL CHARACTERISTICS PER LINE $T_A @ 25^\circ\text{C}$ Unless Otherwise Specified

$V_f=3.5\text{V}$ at $I_f=25\text{A}$ (uni-directional only)

PART NUMBER (Notes 5-6)	STAND-OFF VOLTAGE V_{WM} VOLTS	BREAKDOWN VOLTAGE $V_{(BR)}$ @ I_T VOLTS ⁽¹⁾		TEST CURRENT @ I_T mA	MAXIMUM CLAMPING VOLTAGE @ I_{PPM} V_C VOLTS	MAXIMUM PEAK PULSE SURGE CURRENT @ $I_{PPM}^{(2)}$ AMPS	MAXIMUM REVERSE LEAKAGE @ V_{WM} $I_D^{(3)}$ μA
		MIN	MAX				
ALPSMAJ10 / C	10	11.1	13.6	1.0	18.8	21.3	1.0
ALPSMAJ10A / CA	10	11.1	12.3	1.0	17.0	23.5	1.0
ALPSMAJ11 / C	11	12.2	14.9	1.0	20.1	19.9	1.0
ALPSMAJ11A / CA	11	12.2	13.5	1.0	18.2	22.0	1.0
ALPSMAJ12 / C	12	13.3	16.3	1.0	22.0	18.2	1.0
ALPSMAJ12A / CA	12	13.3	14.7	1.0	19.9	20.1	1.0
ALPSMAJ13 / C	13	14.4	17.6	1.0	23.8	16.8	1.0
ALPSMAJ13A / CA	13	14.4	15.9	1.0	21.5	18.6	1.0
ALPSMAJ14 / C	14	15.6	19.1	1.0	25.8	15.5	1.0
ALPSMAJ14A / CA	14	15.6	17.2	1.0	23.2	17.2	1.0
ALPSMAJ15 / C	15	16.7	20.4	1.0	26.9	14.9	1.0
ALPSMAJ15A / CA	15	16.7	18.5	1.0	24.4	16.4	1.0
ALPSMAJ16 / C	16	17.8	21.8	1.0	28.8	13.9	1.0
ALPSMAJ16A / CA	16	17.8	19.7	1.0	26.0	15.4	1.0
ALPSMAJ17 / C	17	18.9	23.1	1.0	30.5	13.1	1.0
ALPSMAJ17A / CA	17	18.9	20.9	1.0	27.6	14.5	1.0
ALPSMAJ18 / C	18	20.0	24.4	1.0	32.2	12.4	1.0
ALPSMAJ18A / CA	18	20.0	22.1	1.0	29.2	13.7	1.0
ALPSMAJ20 / C	20	22.2	27.1	1.0	35.8	11.2	1.0
ALPSMAJ20A / CA	20	22.2	24.5	1.0	32.4	12.3	1.0
ALPSMAJ22 / C	22	24.4	29.8	1.0	39.4	10.2	1.0
ALPSMAJ22A / CA	22	24.4	26.9	1.0	35.5	11.3	1.0
ALPSMAJ24 / C	24	26.7	32.6	1.0	43.0	9.3	1.0
ALPSMAJ24A / CA	24	26.7	29.5	1.0	38.9	10.3	1.0
ALPSMAJ26 / C	26	28.9	35.3	1.0	46.6	8.6	1.0
ALPSMAJ26A / CA	26	28.9	31.9	1.0	42.1	9.5	1.0

ELECTRICAL CHARACTERISTICS PER LINE $T_A @ 25^\circ\text{C}$ Unless Otherwise Specified

$V_F=3.5\text{V}$ at $I_F=25\text{A}$ (uni-directional only)

PART NUMBER (Notes 5-6)	STAND-OFF VOLTAGE V_{WM} VOLTS	BREAKDOWN VOLTAGE $V_{(BR)}$ @ I_T VOLTS ⁽¹⁾		TEST CURRENT @ I_T mA	MAXIMUM CLAMPING VOLTAGE @ I_{PPM} V_C VOLTS	MAXIMUM PEAK PULSE SURGE CURRENT @ $I_{PPM}^{(2)}$ AMPS	MAXIMUM REVERSE LEAKAGE @ V_{WM} $I_D^{(3)}$ μA
		MIN	MAX				
ALPSMAJ28 / C	28	31.1	38.0	1.0	50.0	8.0	1.0
ALPSMAJ28A / CA	28	31.1	34.4	1.0	45.4	8.8	1.0
ALPSMAJ30 / C	30	33.3	40.7	1.0	53.5	7.5	1.0
ALPSMAJ30A / CA	30	33.3	36.8	1.0	48.4	8.3	1.0
ALPSMAJ33 / C	33	36.7	44.9	1.0	59.0	6.8	1.0
ALPSMAJ33A / CA	33	36.7	40.6	1.0	53.3	7.5	1.0
ALPSMAJ36 / C	36	40.0	48.9	1.0	64.3	6.2	1.0
ALPSMAJ36A / CA	36	40.0	44.2	1.0	58.1	6.9	1.0
ALPSMAJ40 / C	40	44.4	54.3	1.0	71.4	5.6	1.0
ALPSMAJ40A / CA	40	44.4	49.1	1.0	64.5	6.2	1.0
ALPSMAJ43 / C	43	47.8	58.4	1.0	76.7	5.2	1.0
ALPSMAJ43A / CA	43	47.8	52.8	1.0	69.4	5.8	1.0
ALPSMAJ45 / C	45	50.0	61.1	1.0	80.3	5.0	1.0
ALPSMAJ45A / CA	45	50.0	55.3	1.0	72.7	5.5	1.0
ALPSMAJ48 / C	48	53.3	65.1	1.0	85.5	4.7	1.0
ALPSMAJ48A / CA	48	53.3	58.9	1.0	77.4	5.2	1.0
ALPSMAJ51 / C	51	56.7	69.3	1.0	91.1	4.4	1.0
ALPSMAJ51A / CA	51	56.7	62.7	1.0	82.4	4.9	1.0
ALPSMAJ54 / C	54	60.0	73.3	1.0	96.3	4.2	1.0
ALPSMAJ54A / CA	54	60.0	66.3	1.0	87.1	4.6	1.0
ALPSMAJ58 / C	58	64.4	78.7	1.0	103	3.9	1.0
ALPSMAJ58A / CA	58	64.4	71.2	1.0	93.6	4.3	1.0
ALPSMAJ60 / C	60	66.7	81.5	1.0	107	3.7	1.0
ALPSMAJ60A / CA	60	66.7	73.7	1.0	96.8	4.1	1.0
ALPSMAJ64 / C	64	71.1	86.9	1.0	114	3.5	1.0
ALPSMAJ64A / CA	64	71.1	78.6	1.0	103	3.9	1.0

ELECTRICAL CHARACTERISTICS PER LINE T_A@ 25°C Unless Otherwise Specified

V_F=3.5V at I_F=25A (uni-directional only)

PART NUMBER (Notes 5-6)	STAND-OFF VOLTAGE V _{WM} VOLTS	BREAKDOWN VOLTAGE V _(BR) @ I _T VOLTS ⁽¹⁾		TEST CURRENT @ I _T mA	MAXIMUM CLAMPING VOLTAGE @ I _{PPM} V _C VOLTS	MAXIMUM PEAK PULSE SURGE CURRENT @ I _{PPM} ⁽²⁾ AMPS	MAXIMUM REVERSE LEAKAGE @ V _{WM} I _D ⁽³⁾ μA
		MIN	MAX				
ALPSMAJ70 / C	70	77.8	95.1	1.0	125	3.2	1.0
ALPSMAJ70A / CA	70	77.8	86.0	1.0	113	3.5	1.0
ALPSMAJ75 / C	75	83.3	102	1.0	134	3.0	1.0
ALPSMAJ75A / CA	75	83.3	92.1	1.0	121	3.3	1.0
ALPSMAJ78 / C	78	86.7	106	1.0	139	2.9	1.0
ALPSMAJ78A / CA	78	86.7	95.8	1.0	126	3.2	1.0
ALPSMAJ85 / C	85	94.4	115	1.0	151	2.0	1.0
ALPSMAJ85A / CA	85	94.4	104	1.0	137	2.2	1.0
ALPSMAJ90 / C	90	100	122	1.0	160	1.9	1.0
ALPSMAJ90A / CA	90	100	111	1.0	146	2.1	1.0
ALPSMAJ100 / C	100	111	136	1.0	179	1.7	1.0
ALPSMAJ100A / CA	100	111	123	1.0	162	1.9	1.0
ALPSMAJ110 / C	110	122	149	1.0	196	1.5	1.0
ALPSMAJ110A / CA	110	122	135	1.0	177	1.7	1.0
ALPSMAJ120 / C	120	133	163	1.0	214	1.4	1.0
ALPSMAJ120A / CA	120	133	147	1.0	193	1.6	1.0
ALPSMAJ130 / C	130	144	176	1.0	231	1.3	1.0
ALPSMAJ130A / CA	130	144	159	1.0	209	1.4	1.0
ALPSMAJ150 / C	150	167	204	1.0	268	1.1	1.0
ALPSMAJ150A / CA	150	167	185	1.0	243	1.2	1.0
ALPSMAJ160 / C	160	178	218	1.0	287	1.0	1.0
ALPSMAJ160A / CA	160	178	197	1.0	259	1.2	1.0
ALPSMAJ170 / C	170	189	231	1.0	304	0.99	1.0
ALPSMAJ170A / CA	170	189	209	1.0	275	1.09	1.0
ALPSMAJ180A / CA	180	201	222	1.0	292	1.4	1.0
ALPSMAJ200A / CA	200	224	247	1.0	324	1.2	1.0

ELECTRICAL CHARACTERISTICS PER LINE TA@ 25°C Unless Otherwise Specified

VF=3.5V at IF=25A (uni-directional only)

PART NUMBER (Notes 5-6)	STAND-OFF VOLTAGE V_{WM} VOLTS	BREAKDOWN VOLTAGE $V_{(BR)}$ @ I_T VOLTS ⁽¹⁾		TEST CURRENT @ I_T mA	MAXIMUM CLAMPING VOLTAGE @ I_{PPM} V_C VOLTS	MAXIMUM PEAK PULSE SURGE CURRENT @ I_{PPM} ⁽²⁾ AMPS	MAXIMUM REVERSE LEAKAGE @ V_{WM} I_D ⁽³⁾ μA
		MIN	MAX				
ALPSMAJ220A / CA	220	246	272	1.0	356	1.1	1.0
ALPSMAJ250A / CA	250	279	309	1.0	405	1.0	1.0
ALPSMAJ300A / CA	300	335	371	1.0	486	0.8	1.0
ALPSMAJ350A / CA	350	391	432	1.0	567	0.7	1.0
ALPSMAJ400A / CA	400	447	494	1.0	648	0.6	1.0
ALPSMAJ440A / CA	440	492	543	1.0	713	0.6	1.0

NOTE:

1. $V_{(BR)}$ measured after I_T applied for 300 μs square wave pulse or equivalent
2. Surge current waveform per Fig. 3 and derate per Fig. 2
3. For bi-directional types having V_{WM} of 10 Volts and less, the I_D limit is doubled
4. All terms and symbols are consistent with ANSI/IEEE C62.35
5. Part numbers with "CA" suffix are bidirectional devices, i.e., 5.0ALP SMAJ440CA, the maximum $V_{(BR)}$ is 7.25V.
6. Suffix 'A' denotes 5% tolerance device. Without 'A' denotes 10% tolerance device

TYPICAL DEVICE CHARACTERISTICS CURVES T_A @ 25°C Unless Otherwise Specified

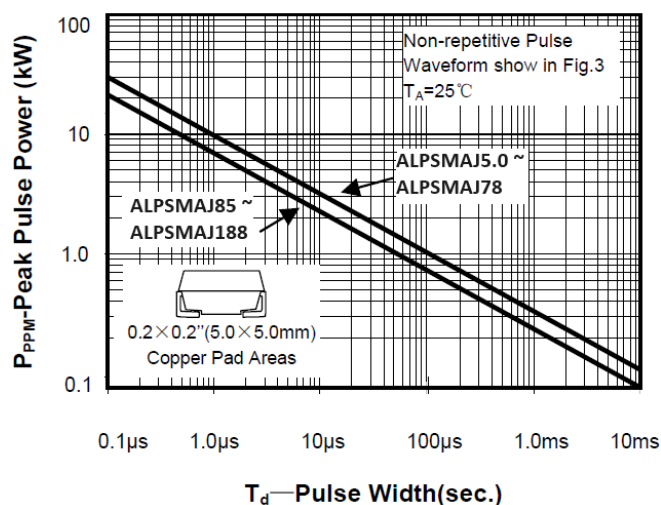


Fig1. PEAK PULSE POWER RATING CURVE

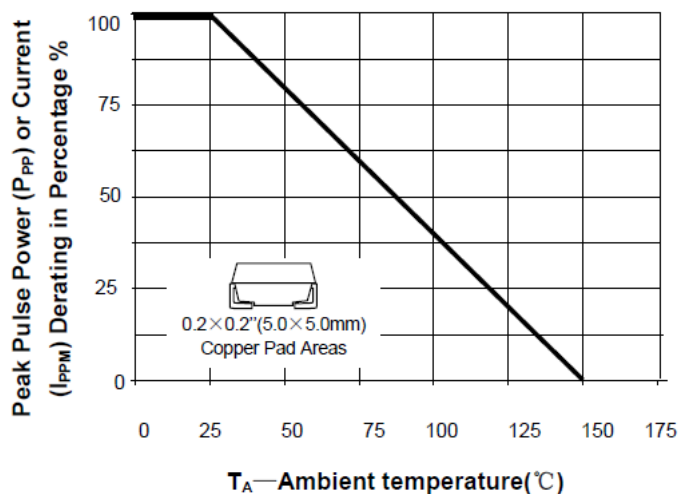


Fig2. PULSE DERATING CURVE

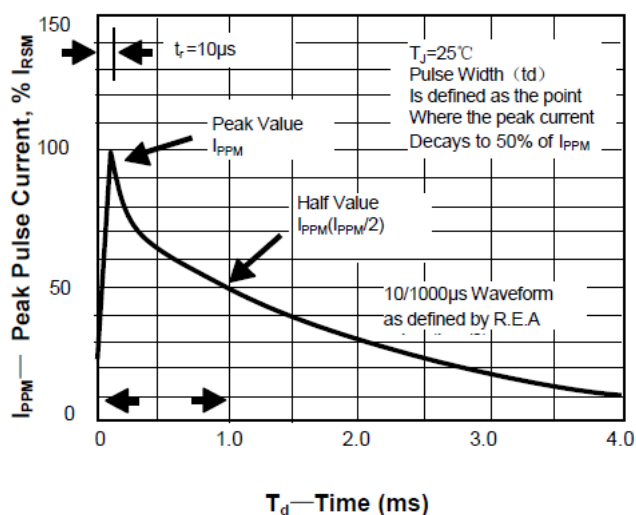


Fig3. PULSE WAVEFORM

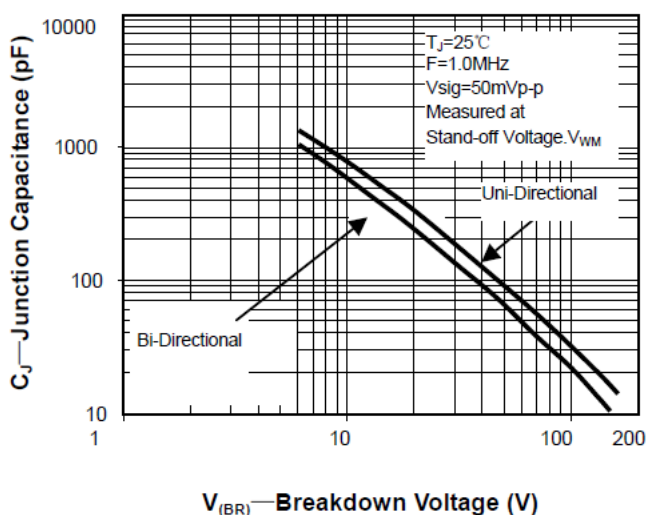


Fig4. TYPICAL JUNCTION CAPACITANCE

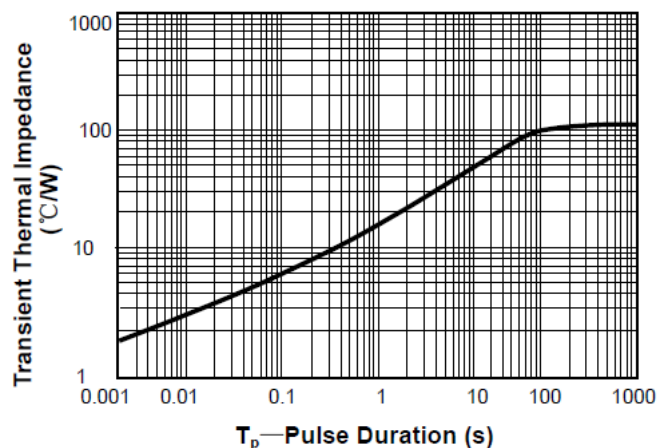


Fig5 TYPICAL TRANSIENT THERMAL IMPEDANCE

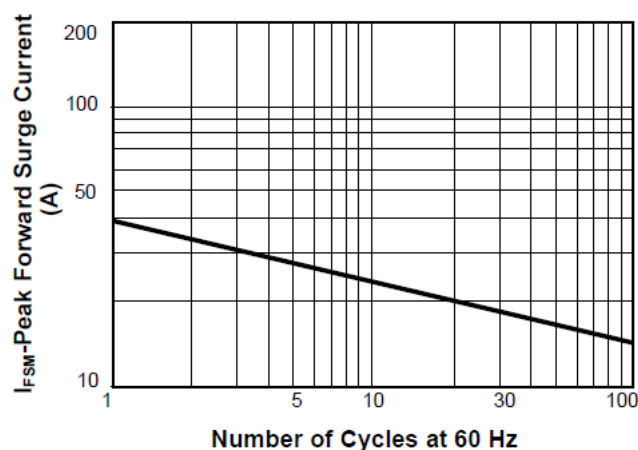
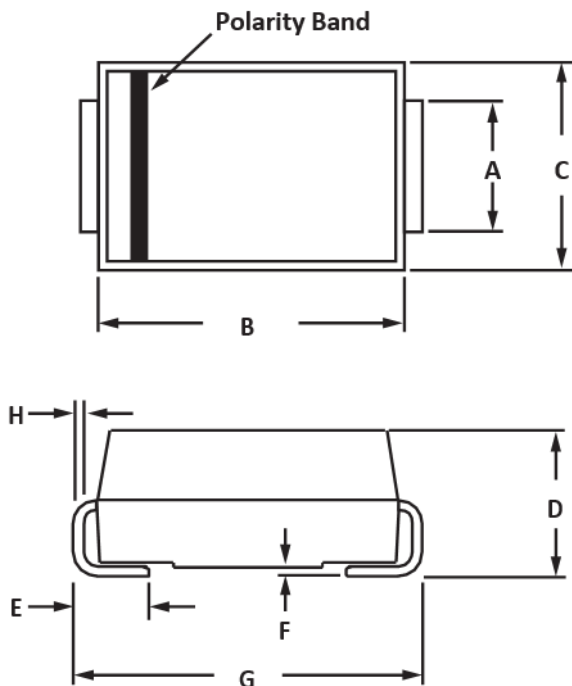


Fig6 MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNI-DIRECTIONAL ONLY

PACKAGE INFORMATION

DO-214AC (SMA)

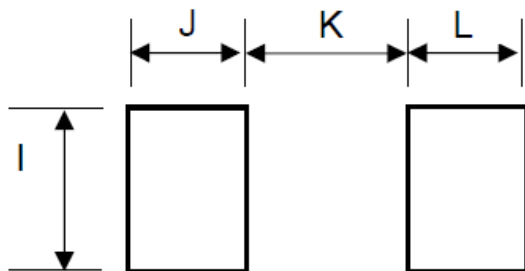


OUTLINE DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.27	1.63	0.050	0.064
B	4.00	4.60	0.157	0.181
C	2.40	2.65	0.095	0.104
D	1.90	2.25	0.075	0.089
E	0.80	1.50	0.031	0.059
F	0.10	0.20	0.004	0.008
G	4.80	5.20	0.189	0.205
H	0.15	0.31	0.006	0.012

NOTES

1. Dimensions are exclusive of mold flash and metal burrs.



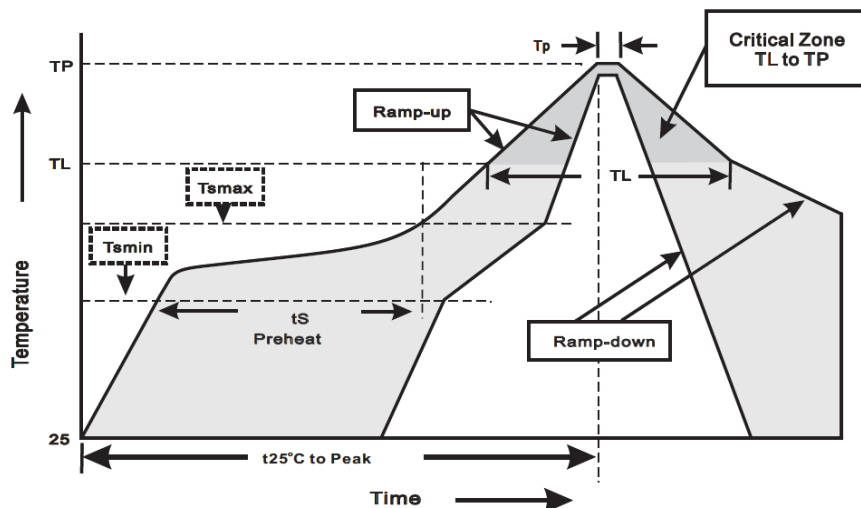
PAD LAYOUT DIMENSIONS

DIM	MILLIMETERS	INCHES
	REF.	REF.
I	1.80	0.071
J	2.10	0.083
K	2.30 (MAX.)	0.091 (MAX.)
L	2.10	0.083

SOLDERING PARAMETERS

SUGGESTED THERMAL PROFILES FOR SOLDERING PROCESSES

1. Storage environment: Temperature=5 °C~40 °C Humidity=55% ±25%
2. Reflow soldering of surface-mount devices



3. Reflow soldering

PROFILE FEATURE	SOLDERING CONDITION
Average ramp-up rate (T_L to T_P)	<3 °C/sec
Preheat	
- Temperature Min (T_{smin})	150 °C
- Temperature Max (T_{smax})	200 °C
- Time (min to max) (t_s)	60 ~ 120 sec
T_{smax} to T_L	
- Ramp-upRate	<3 °C/sec
Time maintained above:	
- Temperature (T_L)	217 °C
- Time(t_L)	60 ~ 260 sec
Peak Temperature (T_P)	255 °C-0/+5 °C
Time within 5 °C of actual Peak Temperature(t_P)	10 ~ 30 sec
Ramp-down Rate	<6 °C/sec
Time 25 °C to Peak Temperature	<6 minutes



beyond boundaries...

ALPSMAJXX&C Series
ALPSMAJXXA&CA Series
DO-214AC (SMA)

PRODUCT HIGH RELIABILITY TEST CAPABILITIES

ITEM	TEST CONDITIONS	STANDARD
Solder Resistance	At 260±5°C for 10±Sec.	MIL-STD-750D METHOD-2031
Solderability	At 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
High Temperature Reverse Bias	$V_{BR} = V_{BR\ NOM} * 80\%$ at $T_J = 150^\circ$ for 168 hrs.	MIL-STD-750D METHOD-1038
Pressure Cooker	15P _{SIG} at $T_A = 121^\circ\text{C}$ for 4Hrs	JESD22-A102
Temperature Cycling	-55°C to +125°C dwelled for 30min and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
Humidity	At $T_A = 85^\circ\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
High Temperature Storage Life	At 175°C for 1000hrs.	MIL-STD-750D METHOD-1031

CUSTOMER NOTE:

DISCLAIMER

The product information and the selection guide facilitates the selection of the ALPINESEMI™'s Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review the Data sheet(s) so as to confirm that the Device(s) meets functionality parameters for your application. The information furnished on the Data Sheet and the ALPINESEMI™'s Web Site is believed to be accurate and reliable at the time of preparation of this document. ALPINESEMI™ however, does not assume any inaccuracies that may arise when the components are mounted and removed. Furthermore, ALPINESEMI™ does not assume liability whatsoever, arising out of the application or the use of any of ALPINESEMI™'s product(s). Neither, does it convey any license under its patent rights nor the rights of others. These products are not guaranteed for use in life saving/support appliances or systems. ALPINESEMI™'s customers using these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and ALPINESEMI™ will not be responsible in any way(s) for any damage(s) resulting from such use.

Please check the website www.alpinesemi.com for continues updates and revision of datasheets.

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Component Disposal Instructions

1. ALPINESEMI™ Semiconductor Devices are RoHS compliant and hence customers are requested to dispose as per the prevailing Environmental Legislation put forth in their specific country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).



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